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10/610,931	07/02/2003	Naoki Ide	239741US6	2547

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EXAMINER	
ZISKIND, ANNA Y	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/610,931	IDE, NAOKI	
	Examiner	Art Unit	
	Anna Ziskind	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 6-10, 12-24, 26-30, and 32-40* is/are rejected.

7)☒ Claim(s) *5,11,25 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

Drawings

The drawings are objected to because Figure 3 has an adder labeled as "31," whereas the specification refers to that adder as "3l". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to

37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 7-9 and 27-29 are objected to because of the following informalities: the first lines of the claims refer to "the metric," whereas their parent claim discusses two different metrics. It is unclear to which metric the claims are referring.

Claims 19, 20, 39, and 40 are objected to because of the following informalities: the claims refer to "a metric to the first predetermined response" and "a metric to the second predetermined response," respectively. However, it is unclear to which responses the claim language is referring.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 12-14 and 32-34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contain

subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the references to "pieces of data" are unclear. The term can be used to describe bits or the possible bit combinations in the Viterbi algorithm. The specification does not address the subject matter found in these claims so as to clarify what is meant by "pieces of data." Further, the claims imply that there is a particular number of pieces of data required to generate a partial response. This is unclear because a partial response is generally applied to data, not generated through the use of a particular number of data elements.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 7, 9, 10, 18, 19, 21-24, 26, 27, 29, 30, 38, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 4571734 (Dolivo et al.).

As to claims 1 and 21, Dolivo teaches a method for decoding an output signal of a communication or recording channel that generates two metrics

corresponding to two possible bit sequences (Col. 1, lines 10-16 and 61-63; Col. 2, lines 26-29). The two metrics are based on two partial responses, which are equal (Col. 2, lines 11-15). The two metrics are then used to define a difference metric, which is used in maximum likelihood decoding (Col. 2, lines 29-40; Col. 4, lines 30-38).

As to claims 2 and 22, Dolivo teaches a receiver filtering stage having a particular frequency characteristic, which is related to the channel frequency response (Col. 3, lines 46-52; Col. 4, lines 46-68; Col. 5, lines 32-42).

As to claims 3 and 23, Dolivo teaches signal equalization as part of the receiver filtering stage (Col. 5, lines 3-8).

As to claims 4, 6, 24, and 26 Dolivo teaches generating two metrics, based on two equal partial responses, each metric being dependent on the reproduced signal equalized by the partial response and a reference signal also equalized by the partial response (Col. 5, lines 58-61; Col. 6, lines 1-15).

As to claims 7, 9, 27, and 29 Dolivo teaches calculating the metrics by taking the square, which is a function as claimed in claim 9, of the difference between the reproduced and reference signals, each signal equalized by the partial response (Col. 6, Eqn. (10)).

As to claims 10 and 30, Dolivo teaches a metric synthesizing step that subtracts one metric from another, thereby combining the two metrics in a predetermined ratio (Col. 2, lines 26-29). Dolivo then teaches using the result of

the metric synthesizing step to perform Viterbi decoding (Col. 1, lines 61-64; Col. 3, lines 46-52; Col. 4, lines 30-38).

As to claim 18, Dolivo teaches the use of a Viterbi algorithm for maximum likelihood decoding, as discussed above. Further, Dolivo teaches the most likely symbol representation of a particular received signal has the smallest path metric (Col. 6, lines 1-15).

As to claims 19 and 39, Dolivo teaches recursively updating the path metric for each path by adding the result of applying a partial response, multiplied by a constant of one, and adding the result to the previously determined survival path metric (Col. 6, lines 64-68; Eqn. (19)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4571734 (Dolivo et al.) in view of US Patent 6185256 (Saito et al.). Dolivo teaches calculating metrics by taking the square of the difference between the reproduced and reference signals, each signal

equalized by the partial response, as discussed in the rejection of claim 7. However, Dolivo doesn't teach calculating metrics by taking the absolute value of the difference between the reproduced and reference signals, each signal equalized by the partial response. Saito teaches measuring the difference between the received and reference signals by taking the absolute value of the difference between the two (Col. 20, lines 52-59). Therefore, it would have been obvious to one of ordinary skill in the art to take the absolute value instead of the square of the difference between the signals. Taking the absolute value instead of the square would yield a smaller result, thereby allowing less memory to be used in storing this result.

Claims 15-17, 20, 35-37, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4571734 (Dolivo et al.) in view of US Patent 6914867 (Tonami).

As to claims 15 and 35, Dolivo teaches the use of two metrics and a Viterbi algorithm to accomplish maximum likelihood decoding, as discussed in the rejections of claims 1 and 10. However, Dolivo doesn't teach that the first metric is a path metric and the second metric is a branch metric. Tonami teaches the calculation of a path metric and a branch metric in order to facilitate Viterbi decoding (Col. 5, lines 35-45). Therefore, it would have been obvious to one of ordinary skill in the art to generate a path value and a branch value in the course of implementing a Viterbi decoding algorithm. The path

and branch metrics are widely used to select the most probable representation of a received signal.

As to claims 16 and 36, Dolivo does not teach the calculation of two branch metrics to accomplish Viterbi decoding. Tonami teaches the generation of two branch metrics in the course of implementing the Viterbi algorithm (Col. 5, lines 35-52). Therefore, it would have been obvious to one of ordinary skill in the art to calculate two branch metrics. The generation of multiple branch metrics is well known in the art as a technique of widening the scope of the search for the most likely symbol representation.

As to claims 17 and 37, the claim language is the same as in claim 15; only the labels of the first and second metrics are reversed. Since the claim(s) does not differentiate how the first and second metrics are used (see last three lines of claim 1), the labels "first metric" and "second metric" may be arbitrarily assigned in the Viterbi implementation. Therefore, the rejection of claim 15 applies to claim 17, because the metric labels need only to be reversed in order to be equally applicable to the teaching of Tonami.

As to claims 20 and 40, Dolivo teaches the recursive technique of updating a metric for a given path, as discussed in the rejection of claim 19. However, Dolivo doesn't teach using the technique to calculate a branch metric. Tonami teaches the calculation of a branch metric (Col. 5, lines 35-45). Therefore, it would have been obvious to one of ordinary skill in the art to apply

the metric calculation technique taught by Dolivo to the branch calculation taught in Tonami. Metric calculation is similar for path metrics and branch metrics, so that the same technique and circuit components may be applied to both calculations.

Allowable Subject Matter

Claims 5 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter. A search of prior art failed to teach, either alone or in obvious combination, a maximum likelihood decoder or decoding method including the use of two partial responses, wherein the second partial response is a differential between the first partial response and the first partial response shifted by 1 channel clock.

Claims 11 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter. A search of prior art failed to teach, alone or in obvious combination, a maximum likelihood decoder or decoding method that includes combining two metrics in

a predetermined ratio, wherein the ratio is adjusted in accordance with the noise frequency characteristic found in a reproduced signal.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US Patent 4788694 (Calderbank).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Ziskind whose telephone number is (571) 272-2769. The examiner can normally be reached on Mon. - Fri., 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anna Ziskind
Examiner
Art Unit 2611

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER